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THE MANGO SHIELD SCALE, ITS FUNGUS PARASITE AND CONTROL

By E. W. BERGER
Entomologist State Plant Board

During the past summer the writer's attention became directed to what appeared to be an unusually severe infestation of the Mango Shield Scale *(Coccus mangiferae* (Green)) in certain mango plantings on Pine Island, Lee County, Florida.

Fig. 1.—Enlarged illustration of Mango Shield Scale showing how the Cephalosporium Fungus generally proliferates from the edge of the scale it has killed to form a delicate halo. This is best shown at top (center), the black oval being due to a small flake of sooty-mold. This same scale is shown in almost the exact center of Fig. 2. X7. Photo by Geo. B. Merrill.

Fig. 2.—Mango Shield Scale on Mango leaves heavily infected with Cephalosporium Fungus. Uniform black areas illustrate how completely the sooty-mold fungus may cover the tops (lower left) and even parts of the bottoms of leaves (right). X¾. Photo by Geo. B. Merrill.

The first specimens received (early June) showed the presence of the Cephalosporium Fungus *(Cephalosporium lecanii)*, a parasite of not infrequent occurrence in Florida on such scales as Pyriform Scale, Mango Shield Scale, Soft Brown Scale, Hemispherical Scale, and others of the soft scale group. It also occurs in the Virgin Islands, Barbados, Cuba, Ceylon, and presumably other tropical and sub-tropical regions.

The question at once arose how effectively will this fungus control this scale by the end of the period of summer rains (mid-September or thereabouts)?

Specimens received in early September verified the surmise that the fungus would spread and become epidemic on this scale. Many leaves heavily infested showed hardly a live specimen, so effectively had the fungus spread. The seemingly excessive presence of Sooty-Mold, which develops in the honeydew excreted by these and similar scales, however, indicated that the insects had, nevertheless, severely sapped many, if not all, trees in the plantings. So much so that the writer decided to visit Pine Island and make a personal inspection of some of the plantings. This was done on October 30 and 31, 1937.

Personal inspection revealed the fact that the fungus had spread like wildfire, effecting what one could call a fair commercial control, but heavily infested trees were black with sooty-mold. Some trees, furthermore, showed that they were suffering injury, as indicated by a shortage of foliage and general appearance.

An interesting observation, made by one of the owners, was that live immature scales were migrating to new growth as evidenced by the presence of bees collecting honeydew. This was verified by an examination of some new growth, which, however, was not plentiful at the time and high up in the trees.

Since oil sprays or soap solutions loosen the sooty-mold, it was indicated to the owners that they give a cleanup spray of oil emulsion or soap, especially to those trees heavily covered with the mold, in order to facilitate its removal by winds and rains. Such a spray might be applied only to the tops of the leaves where the mold is thickest, thus hurrying its weathering-off and allowing sunlight to reach the leaf surfaces previously shaded. This should help the trees to function more normally preparatory to next season's bloom and setting of fruit.

It was further explained, however, that thoroughly spraying both leaf tops and bottoms would be preferable since this would

kill many scale-insects not killed by the fungus as well as loosen the sooty-mold. Directing the spray against the leaf-tops only, was indicated mainly for the benefit of those who might not feel able to bear the extra expense of a more thorough spraying.

It was learned that some growers employ two or more applications of Bordeaux in the bloom to prevent anthracnose on the fruit. At first it was feared that this practice was interfering with the friendly fungus, but since the Bordeaux is directed particularly at the bloom, it is believed that not enough Bordeaux reaches the bottom of the foliage to interfere with the fungus.

It should finally be stated that this scale probably occurs wherever mangoes are grown in Florida.

ENTOMOLOGICAL RECOMMENDATIONS[1]

By RALPH L. MILLER

The value of the citrus of Florida reaches as much as 35 to 40 million dollars annually. Recently the combined values of the vegetable crops of the State have reached as much or more, being 35 to 40 million dollars also.

Since the combined values of these crops reach 75 million dollars, and insect damages are conservatively estimated at ten percent of the value of the crop, and disease damage is estimated at a similar amount, the total loss to the main commercial crops of Florida is seven or eight million dollars.

If we add to this the money spent for labor, materials, and equipment used for insect and disease control, we will have a similar amount involved in the control of insects and disease annually.

This does not include any of the crops grown by small gardeners for home use nor does it include the use of insecticides and fungicides on flowers, lawns, or any ornamental plants. Any of you who have tried to grow flowers or keep a lawn in good shape know how troublesome this can be. None of the household pests, termites, moths, mosquitoes, etc., were included in the above estimates. Omitted also were all the animal and livestock pests such as ticks, screw worms, fleas, etc.

All these above points are mentioned to show the importance of entomological recommendations. We in this assembled group,

[1]Address of the President of the Florida Entomological Society at Gainesville, November 20, 1937.

with our advisers and parent organizations, are responsible for the losses mentioned and the efficiency of the control measures used against the pests and diseases, involving annually over a million or two dollars as well as considerable anxiety, worry, loss of sleep, time, etc.

What the writer is trying to emphasize is that when we so glibly say, spray or dust with lead arsenate, pyrethrum, sulphur, or oil emulsion, or use poison bait, or something else, there may be considerably more importance attached to that recommendation than we realize.

When J. H. Comstock was asked by a student who was a candidate for a doctor's degree in Entomology how long a thesis should be, Mr. Comstock replied, "Long enough to get your degree."

Abraham Lincoln, who was a tall, long-legged man, when involved in a discussion of long and short men, was asked how long a man's legs should be. He replied, "Long enough to reach the ground."

Entomological recommendations are exactly similar. They should be good enough to get results. They must give insect or disease control without damaging the crop and leave no objectionable residue on the crop or in the soil. They must not cause other insects to increase, affect the plant adversely physiologically, nor be too expensive.

To get efficient insect control, first of all the proper material must be used. It must be applied to give good coverage. The correct amount must be used at the correct temperature, time of day, condition of wind, condition of foliage, etc.

Good coverage can be obtained only by making the application with the proper equipment. This may vary from the simplest hand sprayer or hand duster to equipment costing from one to two thousand dollars complete, or even a fifteen to twenty thousand dollar plane. It may be just as foolish to try to use a power duster on too small an area as it would be to try to dust a citrus grove with a hand duster. Each recommendation must be made to fit the type of equipment to be used. If hand equipment is to be used, a different quantity of material may be required than if a plane is to be used. A material that is to go through a hand duster without agitation may need to be conditioned differently from one that is to go through a power duster with plenty of agitation.

An illustration of just what is meant is given below. If we were asked how to control leaf hoppers on beans, we would probably say, "Use sulphur and pyrethrum dust." We might add, "It should be mixed one part of pyrethrum to five to seven parts of sulphur." There we would likely stop and only about one man out of ten could take this recommendation and get good results. This is in no way intended as a criticism of any published bulletin, for this recommendation is fundamentally correct. The difficulty lies in the fact that the kind of sulphur was not specified, nor the strength of the pyrethrum specified. Several forms of sulphur are available; namely, flowers of sulphur, commercial flour sulphur, superfine flour sulphur, conditioned dusting sulphur with inert or alkaline conditioning agent. The mesh test may vary also from 100% through 100 mesh to 97-98% through 325 mesh. Pyrethrum may vary from .05% pyrethrins in activated pyrethrum to .9% pyrethrins in high test ground flowers. The selection by the user of the wrong combination of any of these materials would reduce the effectiveness of the mixture and the recommendations. The method of mixing was not specified and the best methods of or equipment for application were not specified. Besides this, no mention was made of the amount necessary per acre per application and nothing was said as to whether the application should be made when plants were wet with dew or when the temperature was as high as possible.

Another illustration is the recommendation of 1 to 50 lime sulphur solution plus 10 pounds wettable sulphur per 100 gallons for the control of scale crawlers. In the first place, the wettable sulphur may vary from 35 to 95 percent sulphur and may or may not contain a spreader, adhesive, or dispersing agent. All of these points may affect the results obtained.

The most serious reason for the lack of control by these materials is the variation in the amount of materials used per tree or the thoroughness of the application.

Growers have taken the above recommendation, using the riding-spray method, hitting only the outside leaves, and then complained about the poor kill of scale crawlers or scale control. Analyses have shown that such a spraying job deposits less than half as much residue on the leaves as a thorough, inside, walk-and-spray application.

Application of oil emulsion sprays are subject to the same difficulty, although practically no riding-and-spraying is done.

In one instance a grove was examined after spraying and 40 to 50 percent of the leaves on the lower branches were found dry on the lower surface. No matter how good the emulsion used, only poor results will be obtained by improper application. Oils kill only by contact and are absolutely valueless unless the insect to be controlled is hit by the insecticide.

The writer could go on mentioning endless similar instances but these will suffice. To name the materials and concentration to be used for control of a certain pest is merely to confuse the prospective user if details enough regarding their use are not given.

The various points regarding entomological recommendations that should be considered are as follows:

1. INSECTICIDAL MATERIALS. The materials must be known to kill the pest in question under the conditions described.
2. MIXER AND MIXING, IF NECESSARY. The type of mixer must be such that it will give a thorough and uniform mixing of materials used. Poison bait, especially hard to prepare, must not have all the poison in one end or one part of the material and the bran and syrup in the other. There must be no lumps.
3. MATERIALS SHOULD BE PROPERLY CONDITIONED. Dusts should dust well and sprays should spread well without all running off.
4. PROPER EQUIPMENT MUST BE USED, HAND TO POWER, INCLUDING AEROPLANES. Each type of application should be made with the best suited equipment to make the recommendation effective.
5. PROPER AMOUNT OF MATERIAL PER ACRE PER APPLICATION. The amount of material necessary per acre should be based on surface of plants to be covered and should be consistent with the equipment used.
6. NO POISONOUS RESIDUE SHOULD BE LEFT ON EDIBLE PORTIONS OF PLANTS. Plants offered for interstate shipment with poisonous residue above the tolerance are subject to condemnation.
7. NO DAMAGE TO PLANTS MUST RESULT. When plants are severely damaged, the purpose of the recommendation is defeated.
8. NO DETRIMENTAL CHANGE OF SOIL pH SHOULD RESULT. Material should be selected that will have no harmful residual effect on the soil but rather a beneficial effect if possible.
9. NO PHYSIOLOGICAL EFFECTS THAT ARE UNDESIRABLE SHOULD RESULT ON THE PLANT. Arsenical materials in improper quantities harm citrus crops, therefore should be used cautiously.
10. NO RESIDUE THAT PROMOTES THE DEVELOPMENT OF OTHER INSECTS SHOULD BE LEFT ON THE LEAVES.

Dusty inert residues left on citrus leaves promote scale development.

11. APPLY MATERIALS AT PROPER MOISTURE CONTENT OF LEAVES. Spray when leaves are dry, dust when leaves are wet or dry. Do not spray on wilted foliage.
12. APPLY AT PROPER TEMPERATURE CONDITIONS. Nicotine is usually most effective when hot and sulphur and pyrethrum and sulphur when wet. Sulphur dusts are less effective in cool weather than in hot weather.

The writer realizes that we must be more careful about recommandations for many of his own have been rendered less effective because they assumed too much knowledge on the part of the user and were not given in sufficient detail. We can assist considerably by being more accurate, thereby protecting our own reputations and also helping growers considerably more by teaching the proper use of materials and equipment now misused.

INDEX TO THE FLORIDA ENTOMOLOGIST

An index to volumes 1 to 19 inclusive of the Florida Entomologist is now in press. This index contains a table of contents arranged by volumes and an index of the insects by specific and varietal names. This index is to be sold at 75c a copy. Orders should be sent to J. W. Wilson, Business Manager, Lakeland, Florida. Subsequent volumes will have an index in the last number of each volume.

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IMPORTANT PECAN INSECTS OF NORTHERN FLORIDA

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INTRODUCTION

The literature of pecan insects includes reference to at least 125 species of insects that have been reported as attacking the pecan tree and its fruit. Fortunately for the pecan grower, all of these pests are not present in any one section. Insects that cause a great loss in one section may be considered as minor pests in other areas. This paper deals chiefly with the insects that are important in the Monticello pecan-growing section of northern Florida, unless otherwise stated. Some minor pests are mentioned that become important in some years, and two important insects are mentioned that do not occur in Florida except as minor pests.

Pecan Nut Casebearer, *Acrobasis caryae* Grote

In northern Florida the major pecan insect is the pecan nut casebearer. This insect has been persistent in its attack on pecans since the industry was established. It overwinters in the larval stage in hibernacula on the twigs of the past season's growth. In the spring it completes its growth by feeding on the twigs. Adults appear early in May, and maximum oviposition occurs from May 15 to 25, depending on the tem-

[1]In charge of the Cooperative Laboratory, Pecan Insect Investigations, of the Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, and the Florida Agricultural Experiment Station, located at Monticello, Fla.

perature and locality. The first-generation larvae attack the young nuts and do more damage to pecans at this time than at any other period of the season. One larva of this generation may destroy several nuts, as many as two complete clusters, before reaching maturity. The second generation is present from June 15 through July; and since the nuts remaining on the tree are larger at this time, a single larva would not destroy over one or two nuts before reaching maturity. During the third generation the nut shell has formed, the larvae confine their feeding to the outside shucks, and little or no damage is done at this time. This generation does not complete its larval growth in the fall, but overwinters as immature larvae in hibernacula on the twigs. Parasites assist in keeping this insect under control, but in severe infestations spraying measures must be adopted if the crop is to be saved. Spraying experiments for the control of this pest are in progress at the Cooperative Laboratory, Monticello, Fla.

Hickory Shuck Worm, *Laspeyresia caryana* (Fitch)

The next important pecan insect in this section is the hickory shuck worm. This pest is present every year, but does not become serious before June or July. The adult moths are present in the orchard even before the young nuts are pollinated. These early-emerging moths are known to oviposit on hickory nuts and phylloxera galls, and an early generation is passed on them. The overwintering larvae pupate, and adults emerge from February throughout the summer. Maximum emergence occurs the latter part of March or early in April, depending on the temperature and locality. When the newly hatched larvae enter the nuts they fall to the ground, and early in the spring, when the nuts are small, desiccation will in most instances kill the larvae, although later in the season, when the nuts are larger, the larvae can complete their growth in the fallen nuts. In August, when the shells become hard, the larvae confine their feeding to the outside shucks. When the nuts are attacked at this stage they will remain on the tree, but sometimes the shucks will adhere to the shell at harvest. Nuts that are attacked before the shucks start opening usually do not fill out and are placed in a lower grade. Varieties that have thick shucks are always more heavily infested. No control measures are known at present that will successfully keep this insect under control. It is highly parasitized, and this no doubt plays a big part in holding it down.

Pecan Leaf Casebearer, *Acrobasis juglandis* (LeB.)

The pecan leaf casebearer is a pest of as much importance as the hickory shuck worm in certain years when conditions become favorable for its development. It overwinters in the larval stage in hibernacula formed at the base of the buds on the twigs of the past season's growth, in the same manner as the pecan nut casebearer. In the spring when the buds begin to swell the larvae become active and start feeding on the young buds. In heavy infestations they can destroy the foliage as fast as it appears. This is the stage and time when the greatest damage is done to the crop. In many cases the destruction by the pecan leaf casebearer of the terminal and lateral buds, which produce the nuts and pollen, causes the trees to fail to set a crop of nuts. This condition is sometimes attributed by the grower to other causes. Later in the summer, when the foliage has reached its maximum growth, damage from this pest rarely occurs, except in cases of severe infestation. It prefers varieties with luxuriant foliage, and those varieties are usually more heavily infested. This insect has one generation each year, and a large percentage is parasitized. It can be successfully controlled by spraying in the summer.

Black Pecan Aphid, *Melanocallis caryaefoliae* (Davis)

The black pecan aphid must also be recognized as an important pest. It attacks the leaves. It is not so consistent in its seasonal appearance as some of the other pecan insects, but once it becomes abundant in an orchard, preventive measures must be adopted. In severe infestations complete defoliation has been known to occur. This loss of foliage upsets the normal activity of the tree and causes it to shed its fruit. This condition will also affect the crop for the next season. This pest does not become serious before midsummer, and is most certain to appear after bordeaux sprays have been applied for foliage diseases. It prefers varieties with luxuriant foliage and makes its first appearance on the inside lower leaves of the tree. Weather conditions will sometimes assist in its control. Hard showers of rain will dislodge many from the leaves, and it is very improbable that they will reach the tree again. They can be successfully controlled by spraying when necessary.

Minor Pecan Insects

Some pecan insects that are considered as unimportant may under certain conditions become very destructive. The stink

bugs *Nezara viridula* (L.) and *Euschistis euschistoides* Voll. and the leaf-footed bugs *Leptoglossus phyllopus* (L.) and *L. oppositus* Say will migrate to pecans when their preferred host plants are destroyed in or near an orchard. These insects puncture the nuts in feeding and cause a condition called black pit and kernel spot. If the affected nut does not drop to the ground, the kernel will have a discoloration which reduces its value in the markets. These insects are controlled by preventing their host plants from growing in or near an orchard. If at any time they migrate to an orchard, there is nothing that can be done to stop their damage.

The walnut caterpillar, *Datana integerrima* G. & R., and the fall webworm, *Hyphantria cunea* (Drury), become numerous some years in an orchard, and complete defoliation may result if the infestation is heavy. These pests are usually present every season, but control measures are seldom necessary. They are very highly parasitized, and if they become destructive, they can be controlled by hand picking or spot spraying.

The twig girdler, *Oncideres cingulatus* (Say), is usually present in all pecan orchards. The adults appear late in summer and girdle small branches, on which they deposit their eggs. In a heavy infestation severe pruning by the pest will reduce the crop. They can be controlled by collecting and burning all of the twigs that have been attacked.

The pecan budmoth, *Gretchena bolliana* (Sling.), and a casebearer, *Acrobasis caryivorella* Rag., attack the young growing shoots and the foliage of pecan nursery trees. The pecan budmoth also attacks pecan trees of all ages. In severe nursery infestations by either of these insects, growth will be retarded and the trees may become stunted. They can be controlled by spraying in the summer when necessary.

There are several wood borers which attack young nursery trees. Among these are a shot-hole borer, *Xyleborus* sp., and the flatheaded apple tree borer, *Chrysobothris femorata* (Oliv.). These insects do not usually attack healthy growing trees. Damage from these pests can be eliminated by keeping the trees in a vigorous growing condition and by cutting out and destroying all dead and dying limbs or trees.

In western Florida, in the vicinity of Milton and Pensacola, the pecan cigar casebearer, *Coleophora caryaefoliella* Clem., is very destructive in some years. Although this insect is present in all the pecan-growing areas of Florida, it is only in the

western section that it has been considered as important. It overwinters in the larval stage in cases attached to the limbs of the tree. The larvae become active in the spring at about the same time as the buds begin to swell. In heavy infestations they can destroy the foliage in the spring as fast as it appears. It is at this time that the most damage is done. They can be controlled by spraying when necessary.

Injurious Insects Not Important in Florida

There are two important insects that are very seldom observed in this State, but they are very destructive in other sections. The pecan weevil, *Curculio caryae* (Horn), is an important insect in central Georgia, Alabama, and Mississippi. The adults emerge from the ground in July and puncture the nuts in feeding. Later in the season, when the kernel is formed, more nuts are punctured in the process of oviposition. The young grubs mature in four to six weeks and enter the soil, where they remain until the next season. Cultural practices assist in keeping this pest under control.

The obscure scale, *Chrysomphalus obscurus* (Comst.), is an important pest in Texas, Arkansas, Louisiana, Mississippi, and Alabama. It attacks all parts of the tree except the leaves and nuts. As the population increases it spreads over the tree and gradually kills the smaller branches. After the tree has been weakened, it becomes attractive to wood-boring insects, and if control measures are not used it will finally die. This pest can be controlled by spraying during the dormant period.

DESCRIPTION OF NEW VERNAL FORM OF *Thecla wittfeldii* Edwards (*Lepidoptera: Lycaeinae*)

MALES. Expanse varies, but for four males it is about 1.25 inches. Upper side black-brown; primaries have large oval stigma; secondaries have the edge on the hind margin of posterior third fading; large fulvous spot in second median interspace over black on the margin; two tails, the posterior one very long, black, tipped with white, fringes whitish.

Under side slate-gray, inclined to fade in time; the hind margins narrowly edged with white, the costal edge on primaries next to base red. Both wings crossed by two maculate white lines; outer one submarginal, nearly parallel to the margin and quite regularly broken at the nervulae; ornated on the posterior half of secondaries and ending in oblique streak up the inner margin; each spot edged with black on the outer side, and on the primaries in the median interspaces there is more or less fulvous;

outside the black on the secondaries is a large spot on the margin, behind lower median nervule made by blue-white on the slate gray ground and in the next interspaces are three deep red, fulvous spots, diminishing gradually in size, the outer one sometimes obsolete, the largest one with a black patch on the marginal side, the inner of the two lines is somewhat irregular especially on the secondaries and nearly joins the other at the lower median nervule on the secondaries, then makes an angle in the sub-median interspace and ends in a streak up inner margin. In the cell of each wing are two short parallel streaks or bars.

FEMALES. Expanse about .25 inches more than male; upperside same as males except there is no stigmal spot; tails longer than in male; underside as in male.

Taken from four males and two females found near Ocoee, Florida. First found April 1, 1937.

I have often collected in this same locality for years. A second colony was found about ten miles from the first in a country park and was about ten days later, there being specimens in the latter after the original colony was gone.

DEAN F. BERRY
Orlando, Florida

A NEW LIOTHRIPS FROM SPANISH MOSS

By J. R. Watson

***Liothrips dendropogonis* n. sp.**

FEMALE. Color black, with red hypodermal pigment. Fore tibiae and tarsi dark yellowish-brown. Tibiae heavily shaded with dark brown at base. Middle and hind tarsi light brown, considerably darker than fore tarsi. Antennal segment III brownish-yellow, shaded with brown along dorsal border; IV and V and basal third of VI yellowish-brown, progressively more heavily shaded with brown; VII and VIII dark brown except the pedicel of VII.

Head 1.3 times as long as wide. Eyes large, not protruding, occupying about a third of the length of the head. Cheeks slightly arched, converging posteriorly, *bearing several short, weak, but quite evident hair-like spines.* Postocular bristles about two-thirds as long as the eyes, pale, pointed.

Posterior ocelli touching margins of eyes before their middles, large. Vertex not produced.

Antennae inserted close to front of the eyes, nearly twice as long as the head. Segment I *decidedly wider than long;* II cylindrical but sharply constricted a little below the middle to a long, wide curved pedicel; III *decidedly longer than I and II together,* clavate; IV much shorter but wider; VIII sessile, broadly jointed to VII but *not forming with it a fusiform mass.*

Segments I and II provided with hairs as in *urichi;* the following segments provided with two or three rows of short, weak bristles, the basal ones on III near middle, on the others distinctly before the middle.

The longitudinal apical row consisting of *five* or *six bristles* on VIII and *two or three on VII.* Sense area of segment II placed beyond the middle; sense cones short, hyaline; those on segment IV *hardly* twice as long as the distance between their insertions, those on VI *far overreaching* the apex of the segment.

Mouth cone *not* reaching the pterothorax.

Prothorax *about .7* as long as the head; sharply widened posteriorly, including coxae twice as wide as long. All bristles *pointed* at apex; those at posterior angles 105 microns long, curved; those at anterior angles scarcely half as long but heavy; anterio-marginals *farther apart* than the distance from those on anterior angles. Bristle on fore coxae about as long as those on anterior angles, much shorter than those on posterior angles. Fore femora not enlarged, bristle as in *urichi* with short hair-like bristles on entire outer margin and a longer one on inner margin near the base; tibiae with a much shorter one before apex; fore tarsi unarmed.

Wing membrane reaching the *eighth* abdominal segment not narrowed in the middle, clear, only a *slight, light-brownish shading along the edges of the extreme base.* The three sub-basal bristles *pointed* at apex. Hind margin with *14 accessory bristles.*

Abdomen short and heavy. Tube about .8 as long as head. Sides nearly straight but converging near apex. Terminal bristles somewhat shorter than the tube.

Measurements of type. Body length 1.6 mm. Head, length .234 mm., width .196 mm. Prothorax, length .166 mm., width .35 mm. (including coxae); fore femora, length .21 mm., width .09 mm.; fore tibiae and tarsi together, length .28 mm., width .05 mm. Pterothorax, length .41 mm., width .41 mm. Middle femora, length .24 mm., width .068 mm.; middle tibiae and tarsi, length .032 mm., width .047 mm. Hind femora, length .26 mm., width .07 mm.; hind tibiae and tarsi, length .35 mm., width .044 mm. Length of fore wing membrane 1. mm. Abdomen, greatest width .41 mm. Tube, length .187 mm., width at base .07 mm., at apex .04 mm.

Antennal segments: length (width). I, 23(35); II, 49(33); III, 86(33); IV, 70(37); V, 64(33); VI, 61(30); VII, 58(24); VIII, 37(12) microns. Total length .45 mm.

The Paratype has antennal segments II to V clear yellow, IV and V only lightly tinged with brown near apex; VI only slightly darker; and VII light brownish-yellow. The fore wing has 18 accessory bristles. Antennal segment II is 53 microns long; III, 82; IV, 82, and 40 wide; V, 61 long; VI, 59 long and only 20 wide; VII, 54 long; VIII, 42. Head .28 mm. long and .22 wide. Prothorax .18 long.

Otherwise as the type.

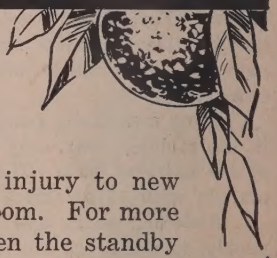
Described from two females, one taken from Spanish moss at Gainesville, Florida, on October 26, 1937, by the writer and J. R. Preer; the other lit on a book of J. R. Preer's May 23, 1937.

Close to *L. urichi* Karny but differing in italicized characters and in the shorter first and longer third antennal segments.

Types in author's collection.

"Black Leaf 40"

KILLS CITRUS APHIS



Protect the fruit and foliage from *Citrus Aphis*. Spray with "Black Leaf 40" while the foliage is young and the infestation is light. Prevent injury to new growth, especially while trees are in bloom. For more than 20 years "Black Leaf 40" has been the standby of particular growers.

ASK YOUR EXPERIMENT STATION

For many years leading authorities have endorsed "Black Leaf 40." It kills insects not only by contact (hitting) but also by fumes. When you mix "Black Leaf 40" with lime-sulphur, oil-emulsion, Bordeaux or calcium arsenate, or soap, you convert nicotine sulphate into volatile nicotine with powerful "gassing" properties.

Likewise, when you dust with Nicotine Dust, insects are killed by actual contact of the dust with their bodies and also by the powerful nicotine gas.

"Black Leaf 40" is a highly concentrated, uniform product. A little goes a long way —therefore economical. May be added to other standard sprays.

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KILLS BY CONTACT AND FUMES